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Discussion

Dr Ross Bremner *(Phoenix, Ariz)*. Thank you very much, and congratulations on yet another great presentation and certainly a very interesting and clearly written article.

The optimal drainage procedure for gastric interposition has been debated perhaps even longer than the optimal treatment for stage III lung cancer, but I will try to be brief. The idea of a quick Botox injection is indeed intriguing, and although you do not measure the time it takes to do the Botox procedure versus a formal pyloric procedure, I am sure your conclusion that it is quicker is probably correct. I do have a couple of questions.

How exactly do you do this? How expensive is the drug, and do you know intraoperatively that you have done it adequately? Can you feel that the muscle is now paralyzed?

Dr Cerfolio. Thank you, and those are good questions. We do not put a scope into the stomach and look endoscopically to ensure proper placement, if that is what you mean. We do it by touch. The pylorus is easily palpated. We inject Botox into it in all 4 quadrants, and we are very careful on the side next to the gastroepiploic artery. We inject the Botox in equal parts into all 4 quadrants. Because I had really no baseline to go on, no previous publications on this new idea to read, or anyone to ask, I just curb-sided my gastrointestinal guys and decided to copy what they were doing endoscopically and do it open at the time of laparotomy. You can see the Botox go into the pylorus; you get a little wheal when you are injecting it sort of in the submucosal area, and then I just sort of massage that in like a plastic surgeon does on the forehead. I have talked to a couple plastic surgeons, and I guess that is what they do when they do eyebrows and foreheads. Again, I just really made this up.

Dr Bremner. How expensive is it?

Dr Cerfolio. It is expensive. Actually, it is interesting that the billing office at the University of Alabama at Birmingham is very aggressive with our operative notes, and they actually bill for it. There is some code for chemodenervation of the muscle I see when I get these operative notes to sign, and therefore one can and should bill for it.

Dr Bremner. I am a little concerned about the temporary nature of Botox. From the experience of gastroparesis and endoscopic Botox, we know that it lasts just about 3 to 5 months. In our cases in which we have had to do a later operation to open up the pylorus for gastric emptying, it is usually done more than 6 months later. I wonder whether you have had any of your patients in whom you have had to do an endoscopic redo Botox procedure if they had gastric emptying problems?

Dr Cerfolio. We have not had to do that yet in the Botox group. Now we certainly have used Botox in the other patients who have very slow emptying, but I think that is much easier than a redo or first-time pyloromyotomy after esophagectomy when the pylorus is in no man's land at the level of the diaphragm. I have never gone back and had to reoperate on any of these patients for pyloric obstruction, but we have used Botox in the other group, especially in the group in which we did not do anything to the pylorus initially. I think it works. But in those in whom we have treated the pylorus initially with Botox, I have been thrilled with their emptying, even after 3 to 5 months.

Dr Bremner. Do you have a very narrow conduit?

Dr Cerfolio. We tubularize the conduit to about 5 or 6 cm in each patient. I think it is a real mistake to make the conduit too wide or too redundant. I keep the stomach straight and narrow and tall: a straight shot into the abdomen from the chest.

Dr Bremner. The study is unfortunately limited because you stated here and well in the article that the objective data on long-term emptying are not there, and I think it would be really nice if you could do a radiographic emptying study, even on a subsection of these patients. I mean, if you could just randomly select 20 patients from each of the groups and do an emptying study a year or 2 down the line, it would be really nice to see what that it looks like and perhaps even do a nuclear study to see whether there is any bile reflux. Do you plan on doing something like that?

Dr Cerfolio. You are right, and we have some data on some of the patients, but as I told Ayesha (and we all know Ayesha, she was supposed to present this), unless you have the data for all the patients, it does not make sense to show them for some patients. We really have data for only a few patients who were having problems. I would argue that I am in this to take care of the patient. If the patient is happy and swallowing well and maintaining his or her weight, I do not care too much what it looks like on some study, so why do it? I think our surveys, which were very accurate and in which we used the same script on everybody, were our best objective criteria of how they were swallowing. I think if we do a prospective multi-institutional study on the best way to handle the pylorus (ie, pyloromyotomy, nothing, or Botox), then we will have to build the cost of that in. Also, it will be harder to tell the patients that if they are doing well, they have to come back and have a swallow test at 3 or 6 months, but that might

be the way to design it prospectively to really have data to answer the question. I am biased now and would favor the Botox group because I am convinced after doing all 3 procedures that it offers the best results.

Dr Bremner. Finally, you noted that the chemoradiation group had prolonged or delayed gastric emptying. Do you have a reason for this?

Dr Cerfolio. Well, I do not know the exact reason. I can guess. I am not sure, but I think it has to do with the fact that the conduit is now being radiated. It clearly is in the radiated field and then on top of a surgical manipulation, of grabbing it, stapling it, denervating it: all those things together add up.

Dr Bremner. I think that possibly a narrow conduit or Botox might be the answer, and I really look forward to participating in a prospective trial like you mentioned. Thank you very much, and thank you for the privilege of discussing the article.

Dr Cerfolio. Thank you.

Dr Richard Whyte *(Stanford, Calif).* Cerf, I enjoyed your article. It was really very good. I have a quick question, though. You had talked about using metoclopramide, erythromycin, and esomeprazol in these patients. Did you use that same combination throughout the years of the trial, or did that vary as well?

Dr Cerfolio. We were supposed to use it all the way through. If you looked at some of the first patients, they might not have gotten it every day postoperatively, but everyone was supposed to receive it. After that, though, our postoperative algorithms were well described with high compliance, and thus the vast majority of the patients have been receiving them all. We do not use the metoclopramide out for a month, but in the hospital we have been trying to do that. When I was at Mayo, I was lucky enough to spend time with Dr Keith Kelly, who is a general surgeon who spent a career working on gastric emptying, and I spent 3 months with him, so I always was very interested in gastric emptying, and we sort of stole some of his ideas for these patients. It is not really in the thoracic literature, but Dr Jessica Donnington has written a nice chapter on the use of this treatment in the thoracic surgical clinics.

Dr Donald Low *(Seattle, Wash).* First of all, as usual, this is a very innovative, very interesting, and appropriate idea that we should be looking at carefully regarding the management of these patients. I notice that, first of all, you use the shotgun approach. You start everything on everyone in every case before you do your assessment.

Dr Cerfolio. Yes, just like I coach my Little League teams: we come out running trying to steal bases early, and in basketball we start off with a full-court press right out of the shoot. We come out in the first inning and quarter and throw everything at them to win the ballgame. Absolutely.

Dr Low. That is great. Maybe as far as winning that is good, but maybe not for cost-effectiveness and assessing the results of overall outcomes. First of all, you do not do a kocherization?

Dr Cerfolio. No.

Dr Low. For those of us who do this regularly, we recognize sometimes the duodenum is very mobile. It is all ready. You can move it right up to the esophageal hiatus. In other situations it is very tacked down, and I think one of the issues regarding emptying is making sure your conduit is verticalized and straight and that the pylorus is sitting 2 to 3 cm below the hiatus in a straightforward way. Do you not think that should be a part of the assessment and the intraoperative aspects of what we are doing to ensure good emptying at the time of surgical intervention?

Dr Cerfolio. It is a great question. It is one of the flaws of the study course. One of the reasons I stopped doing a Kocher maneuver is that I am not convinced that it makes a difference. But I totally agree that the stomach should not be redundant or floppy because over time it always gets worse. If you see those patients back at 3 or 4 years and if they are alive and they have a big floppy conduit, they empty poorly. They look like they have long-standing achalasia with a sigmoid esophagus, and therefore I take out so much stomach when I am in the chest, not as much in the neck, that I asked myself why I was taking the time to do a Kocher maneuver when I am resecting so much stomach. The conduit was still straight and tall without the Kocher maneuver, it seemed. It took time: not much, but some. There is some risk, but not much, but everything is about efficiency and speed, and I think that the Kocher maneuver did not make a difference. Now it is funny how sometimes you do not do a Kocher maneuver and yet sometimes you still have a very nice straight column and sometimes you do not. If someone has had a previous operation and they are socked in there, I will take that down a little bit to try to ensure the conduit is vertical, but I know that patients do not need a formal Kocher maneuver to get a straight verticalized conduit.

Dr Low. One of the many things you are well known for is your clinical pathways and fast tracking. I assume that includes the reinitiation of dietary profiles after surgical intervention.

Dr Cerfolio. Right.

Dr Low. What we have found is that some of the aspects of aspiration, emptying, and so on have to do with what you are feeding the patient, and a lot of the feedback we get has to do with that barium swallow that you do at 4 days. Do you think that we are too far into clinical pathways and that we should be assessing these swallows ourselves to assess how we should be introducing erythromycin, metoclopramide, dietary profile, and Botox on an individual basis rather than for baseball teams and for surgical patients using …

Dr Cerfolio. … or basketball. That is another very good point. I think that the team is the critical thing, and it is really not the surgeon. You guys know I am not modest, but it is the team, especially with patients undergoing esophagectomy. I am, without a doubt, the most easily replaced part of the team. We now have several supernurses who just take care of the patients who have had esophagectomies. We have a team of swallowing specialist nurses, a speech and swallowing team that comes by and does these studies. We have radiologists who are very into doing this and making sure—because we have had a death in the radiology suite after a swallow—that it is being done correctly and safely. Therefore I think your point is right. There are some patients in whom probably you should not do a swallow test on the fourth or fifth day because it is just not safe. They are not ready. They do not pass their bedside swallow test, which we do on everyone first before we send them for a swallow test. If they have poor emptying and a column of barium in their conduit, then the radiologist places a soft small catheter through the anastomosis and sucks everything out to prevent aspiration, but I think your point is well taken.

Dr Jemi Olak *(Bakersfield, Calif).* How did you measure bile reflux in your patients in the postoperative period and then subsequently?

Dr Cerfolio. We did not measure it scientifically, as you suggest, but we did measure it clinically. We have a survey that goes all the way from what they eat and how they eat to looking at their dumping symptoms. We ask things like whether they have any type of sensation of things coming up. A lot of these people had endoscopies afterward. Was there evidence of bile coming up? Pillow staining was a specific question they were all asked to assess for bile reflux as well. Therefore a very specific survey, I think, was the best way I could get a handle on it, but you are right, it is not scientific. It is not a radionucleotide tag particle that is bound to the bile molecule to see whether it is coming up, which would be nice but is really not practical or very cost-effective. Most importantly, if the patient is happy and asymptomatic, I am not sure what I would do with that information.